this book in endeavouring to present the position of electrical theory and practice by methods "not in consonance with the conventional forms of mathematical symbols."

There is one matter to which we feel we must refer in conclusion, though it does not affect the general merits of the book. Surely never was an index more curiously compiled since someone wrote, "Mill, on Liberty: do., on the Floss" in a book catalogue. What can be said of such entries as these? "Both fields interdependent," as a reference to the interdependence of the electric and magnetic fields; "First Consul's opinion"; "Electricity, mystery of, 4; physicists cannot explain, 5; contingencies increase, 6; reason obvious, 7"; "Whence mechanical work?" If the rest of the index were comprehensive and well-arranged, such peculiarities might be excused as, possibly, intentionally humorous; but unfortunately such is not the case. Thus arc lamps are indexed under "Lamps, arc," but incandescent lamps under "Incandescent," and there are no cross-references. Also, in the preface a full list of the names referred to in the book is promised in the index, but the majority are not to be found there.

MAURICE SOLOMON.

## THE CAUSES OF MUTATION.

*Mutation et Traumatismes, Etude sur l'Evolution des Formes végétales.* By L. Blaringhem. Pp. 239; 8 plates. (Paris: Félix Alcan, 1908.) Price 10 francs.

ACCORDING to the mutational view of evolution, the kind of variations to the survival of which specific differentiation is due are not such differences between individuals as are always afforded, in any large collection, by fluctuating variability; but variations of an entirely different nature, which de Vries has called mutations. These mutations are not, as repeatedly stated, larger differences than those which are due to fluctuating variability. On the contrary, the differences between the extreme variants of fluctuating variations are often so large that they cannot escape the notice of the most unobservant; whereas the difference between the new types (especially when these are elementary species, and not varieties) which arise by mutation are often so subtle that they can often only be detected by an observer with an intimate familiarity with the species in question.

The great difference, according to de Vries, between these two types of variation is that the maintenance of any new stage which has been reached by the selection of the extreme variants of fluctuating variability is dependent on the continuation of the selection which produced it, whereas the new types which arise by mutation are independent of selection. Of course, if the new types are sickly or are characterised by the acquisition of new characters which interfere with their attainment of maturity they very soon cease to exist. The point is that the origin of the new type on the latter view is independent of selection, whilst on the former it is due to it; and this holds good for the origin of new types in a state of domestication as well as in wild nature. The new form "is seen to be very good after, not before its creation."

But perhaps the most striking difference between the two kinds of variation is that fluctuating variability is exhibited by all animals and plants at all times, whereas mutability appears to be exhibited only very rarely. Indeed, de Vries only found one plant which appeared to be in this state (Œnothera), although he tested a large variety of plants for the purpose. Now, if it is true that evolution is due to the differences presented by mutability, we naturally want to know to what these mutable phases are due; and it is a paradoxical fact that de Vries should have discovered a great deal about the causes of fluctuating variability and next to nothing about those of mutability. A great many of the differences which are classed as fluctuating can be attributed with great certainty to differences of nutrition, and there is a long series of facts (in connection with the limit attainable by the selection of such variations) which go to support this explanation.

Of the causes of mutation little is certainly known, though it is generally held that the inception of a mutable phase is caused by some disturbance of that equilibrium in the germ-plasm which expresses itself in the stability of a species which is not in a mutable state. Indeed, the generality of a belief in that form of variation which has since been called mutation, and of this view, as to the cause of it, is witnessed by the existence of a special French word, "affoler," to express the process by which this disturbance of the equilibrium may be effected. The term "affolement" is also used by gardeners to signify the state which this brings about, in other words, the mutable phase itself. The book before us is an account of a long series of experiments which M. Blaringhem has conducted on the effect of mutilations on the maize and other plants. He finds that the buds which are produced after such mutilation (such as severing the stem) bear a far larger number of abnormal organs—stems, leaves, flowers, and fruits—than do normal unmolested plants; and, moreover, that amongst the offspring of mutilated plants there occur (1) considerable monstrosities; (2) plants which have recovered the ancestral equilibrium; and (3) very occasional slight anomalies which constitute varieties and are perfectly new and constant.

M. Blaringhem has come in touch with the outskirts of an extremely interesting problem, namely, the effect of the rate, at which vital processes take place, on their normality. It may be that the luxuriance of life in the tropics is due to the speed at which ontogenetic processes take place there; if heat increases the rate at which growth takes place (as it is known to), and increased speed leads to increased variability, the luxuriance of tropical life may be simply due to wide range of variations placed at the disposal of natural selection to operate upon. Similarly the enormous speed at which growth proceeds in buds produced on plants which have been cut down to the ground may be the sole cause of the increase in the number of monstrosities produced by them. Here is matter for investigation, the results of which ought

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to be of the greatest interest and value. M. Blaringhem's account of his experiments forms a stimulating starting-point to such an inquiry, and should be read by everyone engaged in the experimental study of vital processes.

## THE SUBJECT-MATTER OF ANTHROPOLOGY.

*The Scope and Content of the Science of Anthropology.* By Juul Dieserud. Pp. 200. (Chicago: The Open Court Publishing Co.; London: Kegan Paul, Trench, Trübner and Co., Ltd., 1908.) Price 8*s*. 6*d*. net.

A PERUSAL of this book will convince most people that the terminology and classification of the subject-matter of anthropology is at present in a state of almost hopeless confusion. In England, early authorities like Hunt defined anthropology as the science of the whole nature of man, including the study of his anatomical, physiological and psychological characters, and this logical view has fortunately been maintained among the majority of anthropologists in this country up to the present day. In France also the original view, as expressed by Pruner Bey, was that anthropology embraces the study of man in time and space, and the great Broca took a very similar view of the scope of the science. In Germany, however, a beginning of the descent from this clear and reasonable definition of the science appears to have been made in 1879 by Müller, who divided anthropology into (1) physical anthropology and (2) psychic anthropology, and this cleavage was made wider by Grosse, who in 1894 completely separated the second of Müller's subdivisions from anthropology and gave it a new designation, namely, ethnology, or the culture of races.

Ethnology and its related term ethnography were henceforth widely applied, chiefly in Germany and America, to a new science dealing with the culture of races. It was excluded from the science of anthropology, chiefly, no doubt, because this study had increased more rapidly than other departments of anthropology, its material data being represented by large collections of tools, weapons, dress and pottery in museums, and its psychic data by numerous memoirs on manners and customs, religion and folklore. From a logical point of view it is difficult to see why the study of the psychological evolution of man, as expressed by the various products of his activity, should be excluded from anthropology—the science of the whole nature of man—and it is still more difficult to see why the term ethnology, which etymologically means the science of peoples or races, should be applied to this new science, for which the proper designation would appear to be that given to it by Achelis, namely, psychical anthropology.

This confusion in the terminology of anthropology is, however, now so widespread that it will take a long time to set it right, and Mr. Dieserud's book will, we fear, only tend to perpetuate the confusion. He shows himself throughout strongly in favour of the misuse of the term ethnology by excluding from its scope all somatic or physical anthropology, though he very illogically compromises between reason and use, or rather abuse, by admitting physical subject-matter under the allied term ethnography.

The second part of Mr. Dieserud's book consists of a scheme of library classification for works on anthropology. He divides the subject into three main classes, namely, (1) general, (2) somatology or physical anthropology, and (3) ethnical anthropology. The second and third classes are further subdivided, and a comparison of some of these subdivisions will give some idea of the consequences of the irrational classification of anthropology which the author has adopted. For example, under class (2) we have a subdivision "racial psychology," and under class (3) a subdivision "ethnical or folk-psychology." The plain man will find it very difficult from the names to discover any difference between the two subclasses. There appears to be a great amount of apparent overlapping in other subclasses; for example, it is difficult to distinguish between palæoanthropology and palæoethnology or archæology, and yet these are separate and distinct subdivisions.

In the details of the physical anthropology section of his classification, the author evidently owes a great deal to the excellent scheme of Prof. Martin, of Zürich, and where he departs from this it is not often by way of improvement.

The subdivision of his third class, "ethnical anthropology (or psycho-socio-cultural anthropology)," is very minute, but apparently here also we have redundancy; for example, "gambling and its implements" and "gambling implements" are two different subdivisions, one of which appears to be unnecessary.

Part iii. of this work consists of a bibliography containing a list of a few important works on anthropology, with notes of their contents, and a list of the chief publications of leading anthropological societies and museums.

Though we cannot recommend Mr. Dieserud's scheme of classification either to librarians or anthropologists, his book is well worth reading, and contains much material that is of great value to the anthropologist who is interested in the question of the scope and content of his science. J. G.

## REFRIGERATION.

*The Mechanical Production of Cold.* By J. A. Ewing. Pp. x+204; illustrated. (Cambridge: University Press, 1908.) Price 10*s*.

LOW temperatures are rapidly becoming of great industrial and scientific importance, so that the general principles of their application are necessary or useful to continually increasing numbers of people. In this book Prof. Ewing has brought the Howard lectures, which he gave to the Society of Arts in 1897, up to date in various directions by the addition of sections on the more important developments in the last ten years. In these attention is paid to such questions as the production of oxygen by the rectification of liquid air and the theoretical investigations

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